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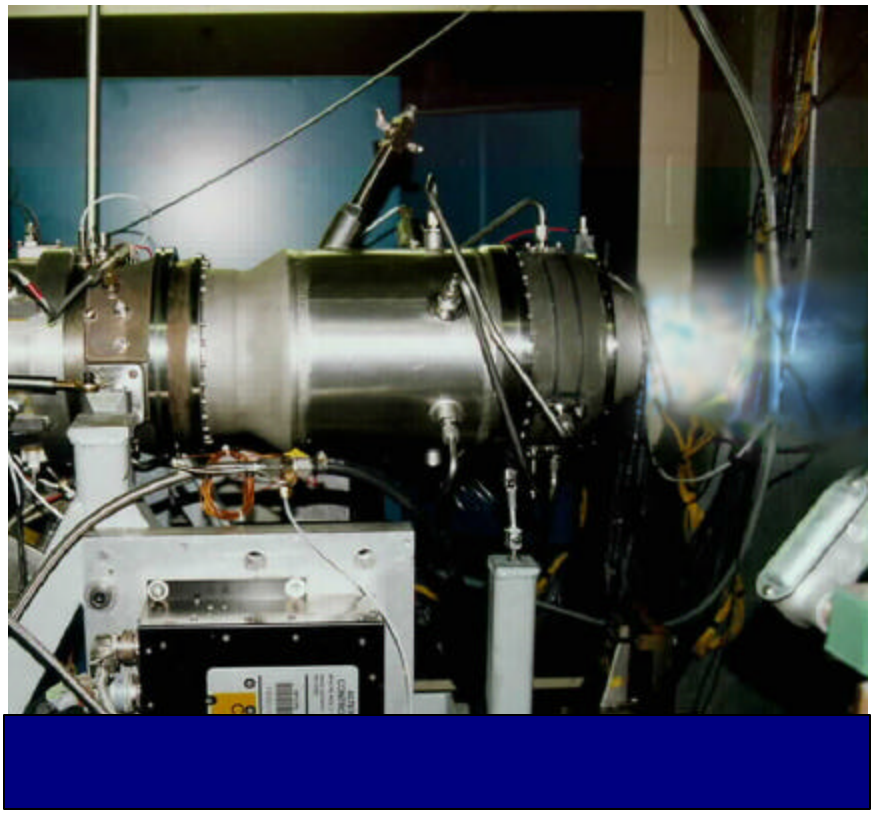
Success Story

SUCCESSFUL TEST BRINGS AFRL CLOSER TO EXPENDABLE TURBINE ENGINE GOALS



The Phase II, first build of Williams International's Joint Expendable Turbine Engine Concept (JETEC) engine, the XTL-86/1, successfully completed testing in 1999 at Williams International's facilities in Walled Lake, Michigan. The JETEC demonstrator is pursuing the Propulsion Directorate's Integrated High Performance Turbine Engine Technology Phase II supersonic expendable engine goals, which are a 45% reduction in cost and a 70% increase in specific thrust.

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Accomplishment

The XTL-86/1, which ran from idle to 100% mechanical speed, established an engine control schedule for future demonstrations. The sea-level static results equate to a 40% increase in specific thrust compared with the baseline J402. The XTL-86/1 test results will allowed testing to begin on the XTL-86/2, which replaces the metallic hot section with ceramic composite and carbon-carbon parts. This new technology enables a 75% increase in cruise speed, and approximately a 40% decrease in reaction time relative to the baseline J402 engine that powers the Harpoon missile.

Background

The XTL-86 has two configurations; one with an all-metal hot section and one that utilizes ceramic components. The ceramic turbine will allow the engine to go beyond the metallic engine capabilities. The ceramic hot section is less expensive and is critical to meeting the JETEC cost goals. The XTL-86/1, is an all-metallic configuration that demonstrated a forward-swept shrouded compressor, a high heat release combustor, and hybrid ceramic fuel-lubed bearings. The success of the XTL-86/1 has paved the way for the second build, the XTL-86/2; which will be tested at Arnold Engineering Development Center in Tennessee. The XTL-86/2 has an uncooled, high-temperature section with a carbon silicon-carbide (C/SiC) turbine rotor, C/SiC turbine nozzle, and a carbon-carbon exhaust nozzle. It will be tested at the Phase II goal demonstration point for approximately 10 hours at operation equivalent to Mach 1.0+.

Additional information

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Propulsion Directorate
Emerging Technologies